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EXAMINER

NGUYEN, DILINH P

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) (previously applied) in view of Pedder (U.S. Pat. 6005466) (previously applied) and further in view of Matayabas, JR. et al. (U.S. Pub. 2004/0191503) (previously applied).

Kaminaga et al. disclose a overmolded electrical component, comprising:

a circuit board substrate 1 having an electrical circuit;

a semiconductor chip 3 overlying the substrate spaced apart therefrom to create a space therebetween;

a plurality of solder 9 interconnections connecting the electrical circuit trace of the semiconductor chip 3; and

a polymeric 7 overmolding encapsulating the semiconductor chip 3 on the substrate 1 and filling the space between the semiconductor chip and the substrate, the overmolding being formed of epoxy package 7 and an inorganic particulate filler (fig. 1a, column 6, lines 10-15).

Kaminaga et al. do not explicitly disclose the substrate and the chip spaced apart therefrom by a distance of from about 10 to 150 micrometers and the polymeric composite including a thermoplastic resin matrix.

However, Pedder discloses a semiconductor device comprising: a circuit board substrate; a semiconductor chip 1; a plurality of solder bumps 4, wherein the solder bumps diameters between 50 and 125 micrometers are considered appropriate for the flip chip structure (cover fig., column 3, lines 28-30), in order to provide a mechanical support for the semiconductor device structure.

Matayabas, JR. et al. disclose a semiconductor device comprising a thermoplastic matrix resin (paragraph 0024 and claim 19) having an inorganic particulate filler is a montmorillonite (claim 13) and wherein the inorganic filler content is 0.5 weight percent to 25 weight percent (claim 30) for the purpose of aiding exfoliation in the composite, assure in quality and low molecular weight components through the material (paragraphs 0044 and 0045).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Kaminaga et al. by having the substrate and the chip spaced apart therefrom by a distance of from about 10 to 150 micrometers and the polymeric composite including a thermoplastic resin matrix because as taught by Pedder and Matayabas, JR. et al., in order to provide a mechanical support for the semiconductor device structure, aid exfoliation in the composite, assure in quality and low molecular weight components through the material.

- Regarding claims 16-17, Matayabas, JR. et al. disclose that the inorganic filler content is 0.5 weight percent to 25 weight percent (Matayabas, JR. et al., claim 30).
- Regarding claims 18-19, Matayabas, JR. et al. disclose that the thermoplastic matrix (paragraph 0024) having an inorganic particulate filler is a montmorillonite (Matayabas, JR. et al., claim 13).
- Regarding claim 20, Matayabas, JR. et al. disclose that the thermoplastic resin matrix comprises a resin selected from the group consisting of polymer (claim 1).

3. Claims 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminaga et al. (U.S. Pat. 6257215) (previously applied) in view of Pedder (U.S. Pat. 6005466) (previously applied) and Matayabas, JR. et al. (U.S. Pub. 2004/0191503) (previously applied) as applied to claim 13 above, and further in view of Yu et al. (U.S. Pat. 5153657) (previously applied).

As discussed in details above, the combination of Kaminaga et al. in view of Pedder and Matayabas, JR. et al. substantially disclose all the limitations as claimed above except for the inorganic filler is glass spheres.

However, Yu et al. disclose an inorganic filler is glass spheres (column 13, lines 45) and wherein an average diameter of from about 1 micrometer to about 3 micrometers (column 14, lines 36-37). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select glass spheres as known material, as taught by Yu et al. into the device structure of the above combination for forming the inorganic fillers as being claimed since the glass spheres would maintain good conformance in the lateral direction

(column 12, lines 31-32). Moreover, selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Claims Allowed

Claims 2, 4-12 and 24 are allowed.

Response to Arguments

Applicant's arguments filed 5/29/07 have been fully considered but they are not persuasive.

- The applicant argues that Kaminaga et al. does not disclose a thermoplastic resin for the overmold/underfill body. Pedder does not describe an underfill or overmold material, and so cannot suggest a thermoplastic material that accomplishes both. Therefore, none of the references (Kaminaga et al., Pedder or Matayabas, JR. et al.) show an underfill that is a thermoplastic resin.

Applicant's arguments have been fully considered but they are not persuasive because this argument has no immediate apparent relevance to the issues presented by the rejection before us since an appellant cannot show nonobviousness by attacking references individually wherein the rejection is based upon a combination of references. In re Young, 403 F. 2d 754, 757, 159 USPQ 725, 728 (CCPA 1968).

It should be noted that the rejection of claims 13 and 16-22 are not based on anticipation, but rather, are based on obviousness.

Examiner relies on the combined teachings at Kaminaga, Pedder and Matayabas, JR. et al.

Kaminaga or Pedder is not relied on for teaching a thermoplastic resin matrix and an inorganic particulate filler. Matayabas, JR. et al. disclose a semiconductor device comprising a thermoplastic matrix resin (paragraph 0024 and claim 19) having an inorganic particulate filler is a montmorillonite (claim 13)

The Examiner thus regards the Applicant's assertions as constituting evidence that the Applicant has failed to consider as a whole the prior art teachings disclosed by the combining of the references.

- Applicant argues that Yu et al. does not contemplate a material that is suitable for underfilling and overmolding a flip chip.

Applicant's arguments has been fully considered but it is not persuasive because Kaminaga et al. disclose the overmolding being formed of epoxy package 7 and an inorganic particulate filler (fig. 1a, column 6, lines 10-15) and Matayabas, JR. et al. disclose a semiconductor device comprising a thermoplastic matrix resin (paragraph 0024 and claim 19) having an inorganic particulate filler is a montmorillonite (claim 13).

Matayabas, JR. et al. do not explicitly disclose the inorganic particulate filler is glass spheres. However, Yu et al. disclose an inorganic filler is glass spheres (column 13, lines 45). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select glass spheres as known material, as taught by Yu et al. into the device structure of the above combination for forming the inorganic fillers as being claimed since the glass spheres would maintain good conformance in the lateral direction (column 12, lines 31-32). Moreover, selection of a known material based on its suitability for its intended

use supported a prima facie obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 5:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2814

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hoai v Pham/
Primary Examiner, Art Unit 2814

DLN